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Patent
Attorney Docket No. <u>1001580-000828</u>

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of) **MAIL STOP AF**
)
Ali Sazegari et al.) Group Art Unit: 2193
)
Application No.: 10/645,555) Examiner: Chuong D. Ngo
)
Filing Date: August 22, 2003) Confirmation No.: 8696
)
Title: COMPUTATION OF POWER)
FUNCTIONS USING POLYNOMIAL)
APPROXIMATIONS)
)

AMENDMENT/REPLY TRANSMITTAL LETTER

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Enclosed is a reply for the above-identified patent application.

☐ A Petition for Extension of Time is enclosed.

☐ _____ Terminal Disclaimer(s) and the ☐ $ 65 ☐ $ 130 fee per Disclaimer due under 37 C.F.R. § 1.20(d) are enclosed.

☐ Also enclosed is/are: _____

☐ Small entity status is hereby claimed.

☐ Applicant(s) requests continued examination under 37 C.F.R. § 1.114 and enclose the ☐ $ 395 ☐ $ 790 fee due under 37 C.F.R. § 1.17(e).

☐ Applicant(s) requests that any previously unentered after final amendments <u>not</u> be entered. Continued examination is requested based on the enclosed documents identified above.

☐ Applicant(s) previously submitted _____ on _____ for which continued examination is requested.

☐ Applicant(s) requests suspension of action by the Office until at least _____ , which does not exceed three months from the filing of this RCE, in accordance with 37 C.F.R. § 1.103(c). The required fee under 37 C.F.R. § 1.17(i) is enclosed.

☐ A Request for Entry and Consideration of Submission under 37 C.F.R. § 1.129(a) (1809/2809) is also enclosed.

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☒ No additional claim fee is required.

☐ An additional claim fee is required, and is calculated as shown below:

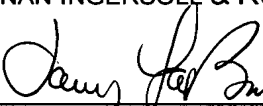| AMENDED CLAIMS					
	No. of Claims	Highest No. of Claims Previously Paid For	Extra Claims	Rate	Additional Fee
Total Claims	18	20	0	x $ 50 (1202)	$ 0
Independent Claims	5	7	0	x $ 200 (1201)	0
☐ If Amendment adds multiple dependent claims, add $ 360 (1203)					$ 0
Total Claim Amendment Fee					$ 0
☐ Small Entity Status claimed - subtract 50% of Total Claim Amendment Fee					0
TOTAL ADDITIONAL CLAIM FEE DUE FOR THIS AMENDMENT					$ 0

☐ Charge _____ to Deposit Account No. 02-4800 for the fee due.

☐ A check in the amount of _____ is enclosed for the fee due.

☐ Charge_____ to credit card for the fee due. Form PTO-2038 is attached.

☒ The Director is hereby authorized to charge any appropriate fees under
37 C.F.R. §§ 1.16, 1.17 and 1.20(d) and 1.21 that may be required by this paper, and
to credit any overpayment, to Deposit Account No. 02-4800. This paper is submitted
in duplicate.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date July 10, 2007   By: _____
                                  James A. LaBarre
                                  Registration No. 28632

P.O. Box 1404
Alexandria, VA 22313-1404
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	) **MAIL STOP AF**
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Ali Sazegari et al.	) Group Art Unit: 2193
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For: COMPUTATION OF POWER	)
FUNCTIONS USING POLYNOMIAL	)
APPROXIMATIONS	)
	)
	)

REQUEST FOR RECONSIDERATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office Action dated April 10, 2007, Applicants respectfully request reconsideration and withdrawal of the rejections of the claims. The allowance of claims 18 and 19 is noted with appreciation.

Claims 1, 4-9 and 21-28 were rejected under 35 U.S.C. § 101, as being directed to non-statutory subject matter. The Office Action characterizes these claims as being directed to a computer-implemented method of calculation, where the inputs are numbers and the results are also numbers, or a computer program for implementing the method. The Office Action states that, in order for the claimed subject matter to be statutory, "the clamed invention must accomplish a practical application. That is, the claimed invention must transform an article or physical object to a different state or thing, or produce a useful, concrete and tangible result", citing *State Street Bank & Trust Co. v. Signature Financial Group*, 149 F.3d 1368 (Fed. Cir. 1998). Applicants respectfully traverse this ground of rejection.

The fundamental underpinning of the rejection appears to be that, since the claimed method involves the processing of data, it is not directed to a practical application, and therefore merely encompasses an abstract idea. However, this position is not supported by

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either the statute itself, or the pertinent case law. The claims are not directed to the manipulation of *any* kind of data. Rather, they are directed to the processing of a media signal, to convert it from one value to another value. For example, the specification discloses that one such type of processing involves gamma correction of a video signal. Such a correction is applied to each pixel in a displayed image. As such, the claims are directed to a practical, i.e., real world, application of the calculations disclosed in the specification.

The fact that the individual pixels are represented by data, e.g. numerical values, does not automatically transform the subject matter into an abstract idea. See *Arrhythmia Research Technology v. Corazonix Corp.*, 958 F. 2d 1053, 22 USPQ2d 1033 (Fed. Cir. 1992). "[T]he number obtained is not a mathematical abstraction; it is a measure of microvolts of a specified heart activity ... That the product is numerical is not a criterion of whether the claim is directed to statutory subject matter." 958 F.2d at 1060, 22 USPQ2d at 1039. Likewise, in the present case, the data values for the media signal are representative of real-world phenomena, e.g. colors, intensity, transparencies, etc. in an image. That data controls the reproduction of the image on a printer or display device. Applicants are not claiming the calculations in the abstract, but rather in the context of a specific, practical application, namely the transformation of a media signal, for correction or other enhancement purposes.

In *Gottschalk, Comr. Pats. v. Benson*, 409 U.S. 63, 175 USPQ 673 (1972), the Supreme Court stated "the mathematical formula involved here has not substantial practical application except in connection with a digital computer, which means that if the judgment below is affirmed, the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself."

In *Diamond, Comr. Pats. v. Diehr and Lutton*, 450 U.S. 175, 209 USPQ 1 (1981) the Supreme Court referred to its decision in the *Benson* case, and went on to state "a claim drawn to subject matter otherwise statutory does not become non-statutory simply because

it uses a mathematical formula, computer program or digital computer... It is now commonplace that an *application* of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection." 450 U.S. at 187, 209 USPQ at 8. In the present case, Applicants are not attempting to *wholly* pre-empt the mathematical calculations disclosed in the specification. Rather, the claims are directed to a specific application of those calculations, namely the transformation of a media signal, to thereby enhance the resulting output generated therefrom. As such, the claim lies within the scope of patentable subject matter defined in 35 U.S.C. § 101. Specifically, claims 1, 4-9 and 24-27 define a "process", which is one of the stated categories of patentable subject matter. Likewise, claims 21-23 and 28 define a "manufacture."

The Office Action states that the "mere recitation in the claims that the input and output are input and output value [sic] for a media signal does not constitute any practical application for the invention." Applicants respectfully traverse this assertion. The Patent and Trademark Office Guidelines relating to the eligibility of subject matter for patenting (reproduced at MPEP § 2106) refer extensively to the *State Street* decision, cited above. The holding in that case does not require anything more beyond that which is currently recited in the claims. In defining what is meant by a "useful, concrete and tangible result", the Federal Circuit stated:

> Today, we hold that the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces "a useful, concrete and tangible result" – a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades. (149 F.3d at 1373)

Hence, the useful, concrete and tangible result was identified to be "*a final share price momentarily fixed*", i.e. a number that has real-world significance. There was no reference to a need for anything beyond the share price in order for the claimed subject matter to be patentable under 35 U.S.C. § 101. The claims of the present application are no less worthy of patent protection. They recite a process that produces a transformed media

signal, i.e. numbers representing physical phenomena. As such, they describe a "useful, concrete and tangible result", as that term was used by the Federal Circuit.

In summary, the claims are not merely directed to an "abstract" idea that wholly pre-empts a mathematical formula. Rather, they are directed to a specific, practical application, namely the enhancement of a media signal that can be defined by numerical values. As such, they fall within the definition of patentable subject matter encompassed by 35 U.S.C. § 101. Reconsideration and withdrawal of the rejection is respectfully requested.

Claims 1, 4, 24 and 25 were rejected under 35 U.S.C. § 103, on the basis of the previously-cited Simanapali et al. and Noetzel patents, in further view of the newly-cited Cho patent (US 6,931,426). In response to Applicants' previous response traversing the rejection based upon the Simanapali and Noetzel patents, the most recent Office Action acknowledges that these patents do not disclose that the length of each interval is individually defined so that the approximation of the mathematical function over the interval by its corresponding polynomial has an error less than a predetermined threshold for all of the intervals. To this end, therefore, the Office Action refers to Figure 3 of the Cho patent, and alleges that it would be obvious to individually determine the length of each interval within the combined disclosures of the Simanapali and Noetzel patents, in view of the Cho patent. It is respectfully submitted that it would not be obvious to combine the disclosure of the patents in such a manner, since to do so would destroy the principle of operation upon which the Noetzel patent is based.

The Noetzel patent discloses an interpolating memory that can be used to evaluate a function. Referring to column 7, beginning at line 59, the patent discloses:

> In the technique of the interpolating memory, *the evaluation interval is partitioned into 2^k segments*, and an approximating function is specified for each segment. *The most significant k bits of x_f identify the segment.* In an implementation, *these bits will be used to address the storage unit holding the parameters of the approximating function.* They will be called the address bits... (emphasis added).

From the foregoing, it can be seen that the technique disclosed in the Noetzel patent relies upon a predetermined number of segments in the interval to be evaluated. That number is a power of 2, whose exponent correlates with the number of most significant bits in the input signal, in order to address the memory. The Cho patent discloses a technique for generating seed values that are stored in a lookup table. Referring to Figures 3 and 4, at step 304 evenly spaced seed points are determined for each input value corresponding to a power of 2. Then, at step 306 a determination is made whether the error value E_1 associated with a point intermediate two consecutive seed points is greater than a preset error value E. If so, a new seed point is added between the two seed points currently being evaluated. This procedure is iteratively repeated, adding additional seed points midway between two successive seed points, until the error for each interval is less than E.

It can be seen that this approach results in an indeterminate number of seed points, and hence an indeterminate number of intervals between seed points. Such an approach would not be feasible within the context of the Noetzel patent. Specifically, the Noetzel relies upon the number of segments being equal to a power of 2, so that a predetermined number of the most significant bits in the input signal can be used as an address for the coefficient memory. If an indeterminate number of segments were employed, by using the technique of the Cho patent, this relationship between the number of segments and the addressing bits would be destroyed. In other words, it would no longer be possible to properly address the memory using a predetermined number of the most significant bits of the input signal.

In summary, therefore, the technique of the Noetzel patent relies upon using a predetermined number of segments that is equal to a power of 2. The method that is disclosed in the Cho patent does not meet this requirement. In that method, the number of seed points, and hence the number of intervals between seed points, is entirely dependent upon the amount of error within a given interval. The number of intervals is not constrained to be equal to a power of 2. As such, an application of the method disclosed in the Cho patent to the interpolating memory of the Noetzel patent would destroy the intended manner

of operation of the memory. Specifically, it would no longer be guaranteed that a predetermined number of the most significant bits in the input signal would identify the proper address locations in the memory.

For at least this reason, therefore, it is respectfully submitted that it would not be obvious to modify the disclosures of the Simanapali and Noetzel patents, as combined in the Office Action, in view of the Cho patent.

Claims 5, 6, 8, 16, 21 and 22 were rejected under 35 U.S.C. § 103, on the basis of the Simanapali, Noetzel and Cho patents, in further view of the Budge patent application publication. The Budge publication was cited for its disclosure of performing a polynomial calculation in a vector processor. It is respectfully submitted that this disclosure does not overcome the deficiencies in the rejection noted above. Specifically, it does not explain how the method disclosed in the Cho patent can be applied to the interpolating memory of the Noetzel, without destroying the principle of operation of that memory.
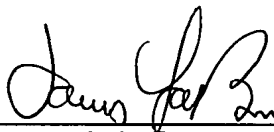
For at least the foregoing reasons, it is respectfully submitted that all pending claims are patentably distinct from the references of record. Reconsideration and withdrawal of the rejections, and allowance of all pending claims is respectfully requested.

Respectfully submitted,

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Date: <u>July 10, 2007</u>   By: _____

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